

WEST Search History

DATE: Thursday, July 15, 2004

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<i>DB=USPT; PLUR=YES; OP=ADJ</i>			
<input type="checkbox"/>	L6	L2 and (heat\$ with (gas flow))	17
<input type="checkbox"/>	L5	L2 and (haze)	1
<input type="checkbox"/>	L4	L2 and (fluorine residue)	7
<input type="checkbox"/>	L3	L2 and (flurine residue)	0
<input type="checkbox"/>	L2	438/905.ccls.	215
<i>DB=PGPB; PLUR=YES; OP=ADJ</i>			
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IDS 4/19/04

6 254 689

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column
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L6: Entry 13 of 17

File: USPT

Jul 28, 1998

DOCUMENT-IDENTIFIER: US 5785796 A

TITLE: Vacuum processing apparatus, vacuum processing method, and method for cleaning the vacuum processing apparatus

Detailed Description Text (77):

A ClF-based gas, e.g., a ClF.sub.3 gas, used as a cleaning gas has a boiling point of about +17.degree. C., and is liquefied when a temperature at which the cleaning gas is used is lower than the boiling point. For this reason, when the cleaning gas is to be supplied, a ClF.sub.3 liquid is heated and vaporized by bubbling, and the resultant ClF.sub.3 gas is supplied. However, when this gas is liquefied in the supply system, a long time is taken for restoring the supply system, and the operability of the apparatus is degraded. For this reason, in this embodiment, a liquefaction-prevention heating means 121 formed by winding, e.g., a heating tape, along the entire path of the cleaning gas feed pipe 112 is arranged around the cleaning gas feed pipe 112 to prevent the cleaning gas from being liquefied. The liquefaction-prevention heating means 121 has a temperature gradient such that the temperature gradually increases along the gas flow direction.

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L6: Entry 2 of 17

File: USPT

Apr 23, 2002

DOCUMENT-IDENTIFIER: US 6374831 B1

TITLE: Accelerated plasma clean

Detailed Description Text (9):

During a plasma-enhanced deposition process, the plasma heats the entire CVD system, including the walls of the processing chamber body 15a surrounding the exhaust passageway 23 and the shut-off valve 24. During a thermal deposition process, heated pedestal 12 causes heating of CVD system. When the plasma is not turned on, or during a thermal deposition process, a hot liquid is circulated through the walls 15a of CVD system to maintain the processing chamber at an elevated temperature. Fluids used to heat the processing chamber walls 15a include the typical fluid types, i.e., water-based ethylene glycol or oil-based thermal transfer fluids. This heating beneficially reduces or eliminates condensation of undesirable reactant products and improves the elimination of volatile products of the process gases and contaminants that might otherwise condense on the walls of cool vacuum passages and migrate back into the processing chamber during periods of no gas flow.

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L6: Entry 6 of 17

File: USPT

Jul 3, 2001

DOCUMENT-IDENTIFIER: US 6254689 B1

TITLE: System and method for flash photolysis cleaning of a semiconductor processing chamber

Abstract Text (1):

A method for flash photolysis cleaning are used to remove photoresist contamination from semiconductor processing chambers. During semiconductor processing, such as etching and stripping, photoresist contamination deposits on the surfaces inside the processing chamber. As more and more semiconductor wafers are processed, the photoresist contamination accumulates and this buildup on the surfaces inside the chamber is the source of particulate contaminants which are damaging to the semiconductor devices processed in the chamber. By using ultraviolet radiation (UV), a reactive agent is generated from the incoming gas flow concurrently with the preferential heating of the photoresist contamination. By flowing oxygen into the semiconductor processing chamber and exposing the oxygen to UV, the highly reactive agent ozone is produced. The reactive agent reacts with the heated photoresist to produce volatile products that are removed from the chamber in the exiting gas flow. A detector is used downstream to determine when sufficient cleaning has occurred and the cleaning process is complete.

Brief Summary Text (17):

UV radiation can be transmitted through a window into the processing chamber, or generated directly inside the chamber, and once inside, it is reflected by the metallic surfaces inside the chamber. However, photoresist is designed to absorb in the blue and the ultraviolet regions of the spectrum, so the photoresist deposits on the inside chamber surfaces will preferentially heat. By flowing oxygen into the chamber while exposing the chamber to UV radiation, the UV radiation will not only preferentially heat the photoresist, it will convert some of the oxygen into the highly reactive oxidizing agent ozone, which will react with the heated photoresist to convert it to volatile products that are carried by the gas flow out of the chamber. The volatilization of the photoresist produces low molecular weight volatile products such as water and carbon dioxide.

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File: USPT

Apr 11, 1989

DOCUMENT-IDENTIFIER: US 4820377 A

TITLE: Method for cleanup processing chamber and vacuum process module

Drawing Description Text (23):

FIGS. 21A and 21B show two structures for reducing conductive heat transfer between a wafer and a transparent vacuum window in rapid thermal processing embodiments, including sample gas flow connections to supply a purge gas to the void between the wafer and the transparent vacuum wall, and

Detailed Description Text (83):

6. Halting gas flows and heating and purging the chamber with an appropriate gas, for example, N.sub.2.

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L6: Entry 3 of 17

File: USPT

Feb 19, 2002

DOCUMENT-IDENTIFIER: US 6347636 B1

TITLE: Methods and apparatus for gettering fluorine from chamber material surfaces

Detailed Description Text (6):

Reactive and carrier gases are supplied through supply line 43 into a gas mixing box (or gas mixing block) 273 (FIG. 5), where they are preferably mixed together and delivered to plate 20. Gas mixing box 273 is preferably a dual input mixing block coupled to a process gas supply line 43 and to a cleaning gas conduit 47. As will be discussed in detail below, a processor 50 preferably controllably operates a gate valve 280 (FIG. 5) to choose which of these two alternate sources of gases are sent to plate 20 for dispersing into chamber 15. Conduit 47 receives gases from an integral remote microwave plasma system 55, which has an inlet 57 for receiving input gases. During deposition processing, gas supplied to plate 20 is vented toward the wafer surface (as indicated by arrows 21), where it may be uniformly distributed radially across the wafer surface, typically in a laminar flow. Purging gas may be delivered into chamber 15 from an inlet port or tube (not shown) through the bottom wall of enclosure assembly 200. The purging gas flows upward past heater 25 and to an annular pumping channel 40. An exhaust system then exhausts the gas (as indicated by arrows 22) into the annular pumping channel 40 and through an exhaust line 60 by a vacuum pump system (not shown). Exhaust gases and residues are preferably released from annular pumping channel 40 through exhaust line 60 at a rate controlled by a throttle valve system 63.

Detailed Description Text (181):

According to a specific embodiment, two-step deposition/reflow process is described below. With gate valve 280 closed, chamber 15 may be maintained at a pressure of about 200-760 torr. With the wafer and heater 25 in the processing position between about 200-400 mil, preferably between about 330-350 mil, from distribution plate 20, the wafer and heater 25 are heated to a high temperature of between about 500-800.degree. C., preferably between about 550-650.degree. C., in chamber 15, for deposition processing. Stopping reactive gas flows, the wafer may then be heated at between about 750-950.degree. C., preferably between about 750-850.degree. C. for about 5-30 minutes, preferably about 15-20 minutes, in order to reflow the dielectric layer, according to a specific embodiment. The reflow temperature may be the same as or higher than the deposition temperature in the two-step process. Further, for a multiple-step deposition/reflow process, the temperature may be ramped from the deposition temperature to an intermediate temperature (or intermediate temperatures) before being ramped to the reflow temperature. Of course, the time and temperature for the heating steps may differ depending

on the particular application being performed and on the particular layer being formed.

Detailed Description Text (195):

Optimally, between the post-clean pumping step and seasoning step is another stabilization step to stabilize chamber pressure and gas flow and to move heater 25 into position for the seasoning step. In this stabilization step, gate valve 280 is closed and chamber 15 is maintained at a pressure of between about 20-70 torr, preferably 50 torr. Heater 25 is also moved to a position of between about 300-550 mil, preferably about 500 mil, from gas distribution plate 20. In a specific embodiment, the seasoning step presently described uses ozone and TEOS with helium as the carrier gas to season chamber 15 for subsequent silicon oxide deposition. Of course, other gases may be used in the seasoning and pre-seasoning stabilization steps, depending on the type of silicon oxide deposition desired. In the pre-seasoning stabilization step, liquid TEOS at a flow rate of between about 200-400 mgm, preferably about 300 mgm, is vaporized and transported with a helium carrier gas flowing at a rate of between about 4000-8000 sccm, preferably at about 6000 sccm, into chamber 15. Gas flows may be introduced into chamber 15 via the normal inlets used for deposition or via applicator tube 292 without application of microwaves. This stabilization step lasts between about 5-25 seconds, preferably about 15 seconds, before the seasoning step begins with the introduction of the oxygen source to begin deposition of the seasoning oxide onto chamber 15. In the thermal seasoning step, ozone is introduced at the flow rate used for the particular deposition process used (e.g., about 5000 sccm for the experimental USG deposition process at 550.degree. C. discussed above, or about 4000 sccm for the experimental PSG deposition process at 600.degree. C. discussed above) for between about 10-20 seconds, preferably about 15 seconds, to deposit a thin layer of silicon oxide (e.g., the experimental USG deposition process having about 12.5 wt % oxygen, or the experimental PSG deposition process having about 8 wt % oxygen) onto surfaces in chamber 15. During the seasoning step, the ozone flow is optimally consistent with the deposition process to minimize any fluctuation in ozone flow and concentration. Seasoning chamber 15 thereby can trap fluorine atoms that may have been adsorbed onto the surfaces of chamber 15.

Detailed Description Text (232):

Having stabilized the chamber pressure, temperature, and TEOS/helium gas flows, and adjusted the position of heater 25, deposition processing can begin. At the onset of the deposition step, O.sub.2 flow is terminated. Liquid TEPO is introduced at a rate of about 24 mgm, and O.sub.3 (about 8 wt % oxygen) is introduced at a rate of about 4000 sccm. Being liquids, the TEPO and TEOS sources are vaporized by the liquid injection system and then combined with the inert carrier gas helium. This mixture is introduced into chamber 15 from gas distribution plate 20 to supply reactive gases to the wafer surface where heat-induced chemical reactions take place to produce the desired PSG film. The above conditions result in a PSG film deposited at a rate of about 1780 .ANG./minute. By controlling the deposition time, a PSG film having a thickness of about 5300 .ANG. is formed at the process conditions described above in about 404 seconds. The wt % of phosphorus in the resulting PSG film is about 4 wt %.

Detailed Description Text (247):

Having stabilized the chamber pressure, temperature, and TEOS/helium gas

flows, and adjusted the position of heater 25, deposition processing can begin. At the onset of the deposition step, O.sub.2 flow is terminated while O.sub.3 (about 12.5 wt % oxygen) is introduced at a rate of about 5000 sccm. Being liquid, the TEOS source is vaporized by the liquid injection system and then combined with the inert carrier gas helium. This mixture is introduced into chamber 15 from gas distribution plate 20 to supply reactive gases to the wafer surface where heat-induced chemical reactions take place to produce the desired USG film. The above conditions result in a USG film deposited at a rate of about 1450 .ANG./minute. By controlling the deposition time, a USG film having a thickness of about 10000 .ANG. is formed at the process conditions described above in about 414 seconds.

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